

DOCKET NO: 259240US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :  
BARDO SCHMITT, ET AL. : EXAMINER: PEZZUTO, H.  
SERIAL NO: 10/509,328 :  
FILED: OCTOBER 7, 2004 : GROUP ART UNIT: 1713  
FOR: METHOD FOR PRODUCING :  
HIGHLY TRANSPARENT PLASTICS FOR  
OPTICAL MATERIALS

REPLY BRIEF UNDER 37 C.F.R. §41.41

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313

SIR:

Responsive to the Examiner's Answer of August 24, 2007, Applicants submit the following Reply Brief for consideration by the Board of Patent Appeals and Interferences.

**Remarks/Arguments** begin on page 2 of this paper.

### REMARKS/ARGUMENTS

In section no. 7 of the Examiner's Answer of August 24, 2007, the Examiner pointed out a typographical error in Claim 1. For clarity, a corrected Claims Appendix is included with the present Reply Brief.

In Claim 1, 1.0 to less than 2.0 mol of the compound of formula (III) is reacted with the polythiol of formula (IV). On the one hand, the Office acknowledges that this feature of present Claim 1 is not disclosed in Bader:

Prior art essentially employ identical process conditions as presently claimed, with the slight difference in number mol of (III) employed. Patentees use at least 2 mols of (III) to react with 1 mol of (IV), whereas appellants use 1 to – 2 moles of (II) to react with 1 mol of (IV). The Examiner is of the position that when the claimed range and the prior art are very similar (i.e. -02 vs. 2), the range of the prior art establishes prima facie obviousness because one of ordinary skill in the art would have expected the closely similar ranges to have the same or essentially the same properties.

See page 4, line 6 from the bottom to page 5, line 6 of the Examiner's Answer of August 24, 2007.

The Office appears to be of the belief that a composition resulting from the reaction of 1 to less than 2.0 mol of a compound of present formula (III) with 1 mol of the polythiol of present formula (IV) would be the same or essentially the same as a composition derived from the reaction of 2.0 or more mol of the compound of formula (III) with 1 mol of the polythiol of formula (IV).

As a first point, it is readily recognized by those of ordinary skill in the art that changing the molar ratio of reactants in a chemical reaction must, necessarily, form a different composition. This is relevant to the composition derived from the reaction of formula (III) with formula (IV) because the ratio at which the compounds (III) and (IV) are reacted with one another will necessarily affect the amount of sulfur (i.e., the amount of the polythiol) present in the resulting composition.

The Office has provided no reasoned technical analysis or basis for asserting that the composition of Claim 1 will be essentially the same as the compositions of Bader. The Office's assertions appear to completely ignore the fact that the compositions must be different at least because the amount of sulfur is different. The rejection is therefore not supportable and should be withdrawn.

The Office rejected Claims 21-23 over Bader (US 5,384,379) as obvious under the meaning 35 U.S.C. §103(a). Applicants argued on pages 6 and 7 of the Appeal Brief filed on April 25, 2007 that the rejection of, *inter alia*, Claims 21-23 over Bader is not supportable. Throughout the prosecution of the present application the Office has remained silent with respect to Applicants' arguments concerning the patentability of Claims 21-23 over Bader.

Claims 21-23 recite different ratios of the compounds of formula (III) and (IV). For example in Claim 21, 1.1-1.8 mol of the compound of formula (III) is reacted with 1 mol of the polythiol of formula (IV). Claims 22 and 23 require that further narrow ranges of 1.2-1.6 mol and 1.2-1.5 mol of the compound of formula (III) are reacted with 1 mol of the polythiol of formula (IV) (see further arguments below).

The Office has provided no argument, legal or technical, that the compositions resulting from the ratios of reactants recited in Claims 21-23 would be the same or essentially the same as the composition of Bader. The Office asserts that an amount of "less 2.0 mol" of the compound of formula (III) may provide a composition that is similar to a composition derived from the 2.0 mol amount disclosed in Bader. The upper threshold of the amount of the compound of formula (III) recited in Claims 21-23 is, however, substantially different than the minimum threshold of the amount of the compound of formula (III) disclosed in Bader. As already stated above, Claims 21-23 have maximum amounts of the compound of formula (III) of 1.8, 1.6, and 1.5 mol, respectively, that are reacted with 1 mol of the polythiol of formula (IV).

The Office has not responded to Applicants' arguments that the (III)/(IV) ratios of Claims 21-23 are different from the 2.0 (III)/(IV) mol ratio asserted by the Office to be disclosed in Bader. The Office has remained completely silent on this point throughout prosecution and likewise in the Examiner's Answer.

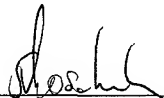
Applicants submit that whatever argument the Office puts forth for asserting that an amount of "less than 2.0 mol" of the compound of formula (III) is essentially the same as an amount of "2 mols" of (III) as the argument is applied to the independent claim is completely without merit with respect to the mole ratios 1.8, 1.6 and 1.5 recited in Claims 21-23.

This ground of rejection is therefore not supportable and the rejection should be withdrawn.

With respect to the Office's other comments with regard to arguments A-D of Applicants' Appeal Brief of April 25, 2007, Applicants respond to the Examiner's Answer by drawing the Board's attention to the arguments already of record in the Appeal Brief.

Respectfully submitted,

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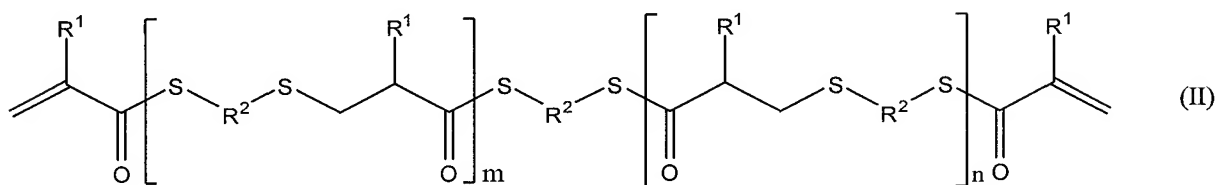
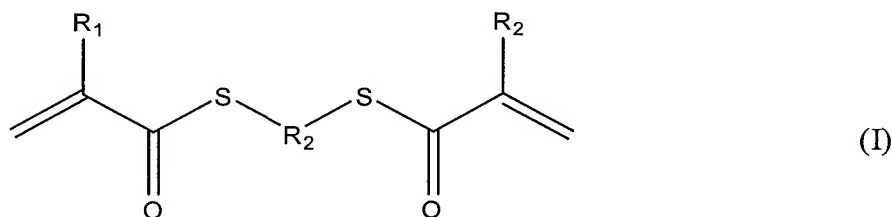
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# VI. CLAIMS APPENDIX

Claim 1: A process for preparing a transparent plastic, comprising:

polymerizing a mixture comprising the compounds of the formula I and formula II

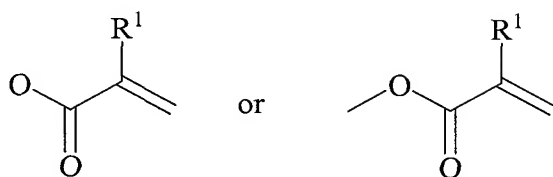


where  $\text{R}^1$  is independently at each instance hydrogen or a methyl radical,  $\text{R}^2$  is independently at each instance a linear or branched, aliphatic or cycloaliphatic radical or a substituted or unsubstituted aromatic or heteroaromatic radical, and  $m$  and  $n$  are each independently an integer of not less than 0, subject to the proviso that  $m + n > 0$ , and

wherein the mixture contains more than 10 mol%, based on the total amount of the compound as per formula (I) and (II), of compounds of the formula (II) where  $m + n = 2$ , prepared by reacting, in the presence of a solvent L, 1.0 to less than 2.0 mol of at least one compound of the formula (III)



where X is chlorine or a radical of formula



with one mole of at least one polythiol of the formula (IV)



where M is independently at each instance hydrogen or a metal cation;

wherein the solvent L is at least one of acetone, acetonitrile, acetophenone, benzyl acetate, n-butyl acetate, quinoline, chlorobenzene, o-chlorotoluene, m-chlorotoluene, p-chlorotoluene, o-dichlorobenzene, m-dichlorobenzene, diethyl ether, diisopropyl ether, dimethyl phthalate, dipropyl ether, ethyl acetate, ethyl benzoate, ethyl butyrate, ethyl formate, ethyl salicylate, isoquinoline, 2-methoxyethyl acetate, methyl acetate, methyl benzoate, methyl butyrate, methyl ethyl ketone, methyl formate, methyl isoamyl ketone, methyl isobutyl ketone, methyl propionate, 2-methylpyridine, N-methyl-2-pyrrolidone, methyl salicylate, nitrobenzene, o-nitrotoluene, m-nitrotoluene, p-nitrotoluene, 2-pentanone, 3-pentanone, phenyl acetate, propyl formate, pyridine, tetrahydrofuran or mixtures thereof.

Claim 2: The process according to Claim 1, wherein the polymerization is carried out under a protective gas atmosphere.

Claim 3: The process according to Claim 1, wherein the at least one compound of the formula (III) is selected from the group consisting of acrylic anhydride, methacrylic anhydride and mixtures thereof.

Claim 4: The process according to Claim 1, wherein the at least one polythiol of the formula (IV) is ethanedithiol.

Claim 5: The process according to Claim 1, wherein the at least one compound of the formula (IV) is reacted in the form of an aqueous alkaline solution which contains 1.1 to 1.5 equivalents of at least one Bronsted base, based on the total amount of the at least one compound of the formula (III).

Claim 6: The process according to Claim 1, wherein the at least one compound of the formula (III) and the at least one compound of the formula (IV) are reacted by concurrent metering into a reaction vessel in at least one inert organic solvent L and in an aqueous alkaline solution, respectively.

Claim 7: The process according to Claim 1, wherein the polymerization is carried out at temperatures in the range from 20°C to 80°C.

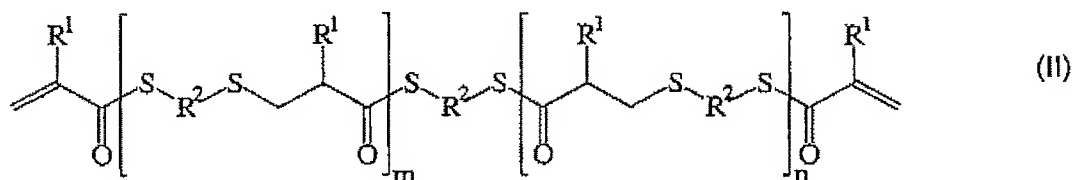
Claim 8: The process according to Claim 1, wherein an acidic ion exchanger is present during the polymerizing or during the reacting.

Claim 9: A transparent plastic prepared according to the process of Claim 1.

Claim 10: An optical lens comprising the transparent plastic as claimed in Claim 9.

Claim 11: The optical lens of Claim 10, wherein the lens is an ophthalmic lens.

Claim 12: A process for preparing a mixture comprising the compounds of the formula I and formula II



where  $\text{R}^1$  is independently at each instance hydrogen or a methyl radical,  $\text{R}^2$  is independently at each instance a linear or branched, aliphatic or cycloaliphatic radical or a substituted or unsubstituted aromatic or heteroaromatic radical, and  $m$  and  $n$  are each independently an integer of not less than 0, subject to the proviso that  $m + n > 0$ , and

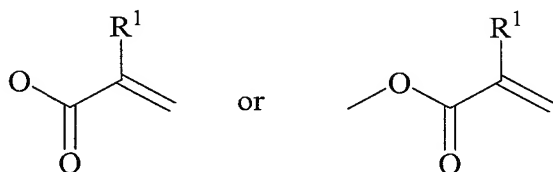
wherein the mixture contains more than 10 mol%, based on the total amount of the compound as per formula (I) and (II), of compounds of the formula (II) where  $m + n = 2$ ,

wherein said process comprises:

reacting 1.0 to less than 2.0 mol of at least one compound of the formula (III)

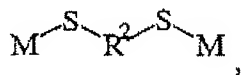


where  $\text{X}$  is chlorine or a radical of formula



with one mole of at least one polythiol of the formula (IV)





(IV)

where M is independently at each instance hydrogen or a metal cation.

Claim 13: A mixture comprising the compounds of the formula I and formula II, prepared by the process of Claim 12.

Claim 14: The process according to Claim 12, wherein the reaction is carried out under protective gas atmosphere.

Claim 15: The process according to Claim 12, wherein the at least one compound of the formula (III) is selected from the group consisting of acrylic anhydride, methacrylic anhydride and mixtures thereof.

Claim 16: The process according to Claim 12, wherein the at least one polythiol of the formula (IV) is ethanedithiol.

Claim 17: The process according to Claim 12, wherein the at least one compound of the formula (IV) is reacted in the form of an aqueous alkaline solution which contains 1.1 to 1.5 equivalents of at least one Bronsted base, based on the total amount of the at least one compound of the formula (III).

Claim 18: The process according to Claim 12, wherein during the reacting the at least one compound of the formula (III) and the at least one compound of the formula (IV) are

concurrently metered into a reaction vessel in at least one inert organic solvent L and in an aqueous alkaline solution, respectively.

Claim 19: The process according to Claim 12, wherein the reacting is carried out at temperatures in the range from 20°C to 80°C.

Claim 20: The process according to Claim 12, wherein an acidic ion exchanger is present during the reacting.

Claim 21: The process according to Claim 1, wherein from 1.1 to 1.8 mol of the compound of formula (III) is reacted with 1 mol of the polythiol of formula (IV).

Claim 22: The process of Claim 1, wherein 1.2 to 1.6 mol of the compound of formula (III) is reacted with 1 mol of the compound of formula (IV).

Claim 23: The process of Claim 1, wherein from 1.2 to 1.5 mol of at least one compound of formula (III) is reacted with 1 mol of at least one polythiol of formula (IV).

Claim 24: The process according to Claim 12, wherein from 1.1 to 1.8 mol of the compound of formula (III) is reacted with 1 mol of the polythiol of formula (IV).

Claim 25: The process of Claim 12, wherein 1.2 to 1.6 mol of the compound of formula (III) is reacted with 1 mol of the compound of formula (IV).

Claim 26: The process of Claim 12, wherein from 1.2 to 1.5 mol of at least one compound of formula (III) is reacted with 1 mol of at least one polythiol of formula (IV).

Claim 27: The process according to Claim 1, wherein the transparent plastic is formed by polymerizing a mixture comprising the product of the reaction of the compound of formula (III) and the compound of formula (IV) to form the transparent plastic having a refractive index of greater than 1.608.

Claim 28: The process according to Claim 1, wherein the transparent plastic is formed by polymerizing a mixture comprising the product of the reaction of the compound of formula (III) and the compound of formula (IV) to form the transparent plastic having an Abbe number above 36.

Claim 29: The process according to Claim 1, wherein the transparent plastic is formed by polymerizing a mixture comprising the product of the reaction of the compound of formula (III) and the compound of formula (IV) to form the transparent plastic having a refractive index of greater than 1.608 and an Abbe number above 36.

Claim 30: The process according to Claim 12, wherein the transparent plastic is formed by polymerizing a mixture comprising the product of the reaction of the compound of formula (III) and the compound of formula (IV) to form the transparent plastic having a refractive index of greater than 1.608.

Claim 31: The process according to Claim 12, wherein the transparent plastic is formed by polymerizing a mixture comprising the product of the reaction of the compound of

formula (III) and the compound of formula (IV) to form the transparent plastic having an Abbe number above 36.

Claim 32: The process according to Claim 12, wherein the transparent plastic is formed by polymerizing a mixture comprising the product of the reaction of the compound of formula (III) and the compound of formula (IV) to form the transparent plastic having a refractive index of greater than 1.608 and an Abbe number above 36.

Claim 33: The process according to Claim 1, wherein the transparent plastic is formed by polymerizing a mixture comprising the product of the reaction of the compound of formula (III) and the compound of the formula (IV) to form the transparent plastic having a refractive index of greater than 1.61 and an Abbe number of greater than 39.

Claim 34: The process according to Claim 12, wherein the transparent plastic is formed by polymerizing a mixture comprising the product of the reaction of the compound of formula (III) and the compound of the formula (IV) to form the transparent plastic having a refractive index of greater than 1.61 and an Abbe number of greater than 39.

Claim 35: The process according to Claim 1, wherein the solvent L is ethylacetate.

Claim 36: The process according to Claim 12, wherein the reacting is carried out in ethylacetate.

Claim 37: The process according to Claim 1, wherein the compounds of formula (I) and (II) are the only polymerizable compounds in the mixture.

Claim 38: The process according to Claim 12, wherein the compounds of formula (I) and (II) are the only polymerizable compounds in the mixture.